United States Department of Agriculture
Forest Service
Region 3
517 Gold Avenue, SW
Albuquerque, NM 87102

Reply To: 3420

Date: FEB 14 1986

Subject: Western Spruce Budworm Biological Evaluation, 1985

To: Forest Supervisor, Santa Fe National Forest

Western spruce budworm (WSB), Choristoneura occidentalis Free., continued to cause extensive defoliation in mixed conifer stands on the Santa Fe NF (SNF) and adjacent lands in 1985. This outbreak was evaluated during July and August by Forest Pest Management entomologists through aerial and ground surveys. Objectives of these surveys were to: determine the extent and relative intensity of defoliation throughout the susceptible forest type; and to collect egg mass data for use in predicting 1986 defoliation in selected areas (Re: your letter dated July 22, 1985). These selected areas included the Pecos Ranger District, the Tesuque Ranger District, National Forest administered lands near Pajarito Ski Area, and the 1977 Suppression and Evaluation Project Area located in the Jemez Mountains. The Mesas area (east of Gallina) was also surveyed as a FPM objective to monitor this isolated, more recent outbreak.

The purpose of this letter is to report results of these surveys to you, and to present management alternatives and recommendations concerning this outbreak.

Results of the aerial survey show 169,150 acres of defoliation on the SNF and adjacent lands in 1985. This was a decrease from 266,475 acres defoliated in 1984. Defoliation on the west half of the forest decreased from 261,775 acres in 1984 to 142,270 acres in 1985. Defoliation on the east side increased from 4,700 acres in 1984 to 26,880 acres in 1985. These survey results are summarized by reporting unit and severity in Table 1.

The density of WSB egg masses per meter square of foliage was determined at sample points located throughout the selected survey areas, then used to predict 1986 defoliation. Defoliation predictions were based upon a comparison of egg mass densities and subsequent defoliation at the same locations over the past serveral years. Results of the 1985 aerial surveys, egg mass surveys, and defoliation predictions for 1986 are presented by survey area in the following discussion:

Pecos Ranger District. Area of defoliation on the Pecos Ranger District increased from 2,750 acres in 1984 to 14,150 acres in 1985. Figure 1 shows the current area of defoliation, located along the western edge of the District from Glorietta Baldy north to Holy Ghost Canyon. Egg mass densities from 12 sample plots located within the area averaged 9.7 (± 3.2) per meter square of foliage. From these data, we predict defoliation will occur over approximately the same area in 1986 with levels of severity generally increasing. Additional areas of light defoliation may occur as far north as Winsor Creek.

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Tesuque Ranger District (including the east side of the Espanola Ranger District). Defoliation in this area increased from 1950 acres in 1984 to 12,730 acres in 1985. Scattered areas of light and moderate defoliation were recorded from Shaggy Peak north to Rio Quemado (Figure 2). Data from 12 sample plots located within the area show an average egg mass density of 19.9 (± 6.7) per meter square of foliage. From these data we predict defoliation will increase in area and intensity from Thompson Peak north to the Forest boundary in 1986. Heaviest defoliation can be expected between Tesuque Creek and Rio Nambe.

Pajarito Area. Defoliation on National Forest administered lands adjacent to the Pajarito Ski Area (Figure 3) decreased in area and intensity from 1984. Data from sample plots located in the general area show egg mass densities averaged 15.5 (± 3.6) per meter square of foliage. Precise defoliation estimates for this area in 1986 are difficult to predict because egg mass densities and subsequent defoliation have shown little correlation in this area over the past 8 years. However, current egg mass densities and a history of light to moderate defoliation during 7 of the last 9 years, suggest light to moderate defoliation can be expected around the Pajarito Ski Area again in 1986.

1977 Suppression and Evaluation Project Area. In 1977 a pilot suppression project was conducted in the Jemez Mountains to evaluate the prolonged effectiveness of suppressing a WSB outbreak early in the infestation cycle and to annually evaluate defoliation and subsequent damages in treated and untreated subunits within the project area. Briefly, data collected annually from sample plots located throughout the area showed egg mass densities and defoliation remained at low levels in the treated subunits and increased in the untreated subunits through 1981. In 1982, egg mass densities increased significantly in the treated subunits and by 1983 had reached levels essentially equal to those in the untreated subunits[1]. Samples taken from these same plots (Figure 4) in 1985, again show the average egg mass densities and the average defoliation between treated and untreated subunits are essentially equal (Table 2).

Although total area of defoliation (Figure 4) decreased over most of this area in 1985, we expect a resurgence in 1986. This prediction is based on 1985 egg mass density data and on the history of fluctuating, chronic defoliation in the Jemez Mountains since 1976.

Mesas. Defoliation in this area was first detected in 1983 on 150 acres. In 1984 the area of defoliation had increased to 5,875 acres, then to 9,110 acres in 1985 (Figure 5). Egg mass samples collected in 1985 from 9 plots located in this unit show an average egg mass density of 7.8 (± 2.5) per square meter of foliage. This is only slightly higher than the 5.3 average found in 1984 and indicates defoliation will occur over approximately the same area and at the same light to moderate intensity in 1986.

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[1] Telfer, W. G., I. R. Ragenovich, and T. J. Rogers. Western Spruce Budworm Suppression and Evaluation Project Using Carbaryl--1977. Progress Report No. 7, USDA Forest Serv., Southwestern Reg. 1981. R-3 84-7. p 1-5.

Management Alternatives

Western spruce budworm management alternatives generally include: No action; direct suppression (a short-term alternative); and silvicultural management a long-term alternative. Under the no action alternative, the existing outbreak would be allowed to run its natural course. Annual defoliation and subsequent damages could be expected for perhaps several more years or until the infestation collapses from natural controls such as: insufficient foliage to maintain the population; unfavorable weather conditions; heavy predation and parasitism; a microbial epizootic; or a combination of these factors. While damages to timber resources will vary with stand parameters and outbreak duration, they may approximate or exceed the following estimates:

Tree Damage	Maximum Average Damages (Percent)
Growth Loss	30
Understory mortality	25
Sawtimber mortality	5
Top-kill	25
Cone crop reduction	90+
Christmas tree use reduction	90+

Continued defoliation, resulting in foliage depletion, top-killing, branch killing, and tree mortality, can effect other resources including recreation, water quality and wildlife habitat. These effects also vary and are often difficult to quantify.

Direct suppression by aerial and/or ground application of insecticides can reduce WSB populations over a given treatment area. For older infestations, such as the Pajarito Area and the general Jemez Mountains Area, direct suppression actions can only be efficacious for 1 to 2 years, possibly preventing tree damages for an additional 3 to 5 years. For new infestions, direct suppression may be efficacious for 3 to 5 years and prevent tree damages for an additional 6 to 8 years. However, the susceptibility of the forest condition is unchanged following utilization of this alternative and, barring a natural collapse, a resurgence in the population to outbreak levels is inevitable. Best results from this alternative are achieved when insecticide applications are made in the early stages of an outbreak, when WSB populations densities are low (<20 per 100 buds). Where populations exceed 20 larvae per 100 buds, or where applications are made to limited areas within a large outbreak (i.e. select stands, scenic corridors, or recreational areas), annual applications of insecticides may be required during the duration of the outbreak to maintain low populations and acceptable damages.

The silvicultural management alternative is a long-term strategy aimed at reducing stand susceptibility and vulnerability principally in commercial timber lands through silvicultural prescriptions implemented during scheduled timber sales. The silvicultural alternative will have little or no effect on the progress of the current outbreak. These strategies include, but are not necessarily limited to:

1. Intermediate cuttings, such as commercial or precommercial thinning, and sanitation/salvage to remove most susceptible species while regulating stocking, increasing stand vigor, and favoring nonhost tree species.

2. Regeneration cuttings, using the clearcut and shelterwood methods, designed to favor establishment of nonhost or seral species and to create a mosaic of various evenaged stands with a lower percentage of susceptible and vulnerable species.

3. Artificial regeneration with nonhost tree species.

Specific cutting strategies are presented in FSH 2409.26a.

Recommendations

We recommend an environmental analysis of the current WSB outbreak and associated forest conditions be conducted to determine pertinent issues and concerns, and to develop specific management alternatives including proposed courses of action. From a biological perspective, we believe direct suppression for the older, existing outbreak will be ineffective beyond 1 or 2 years. In addition, damages already sustained in commercial timber areas will reduce the economical benefits of such actions substantially. We recommend no action in these areas. An exception might be in certain high-value areas where direct suppression could effectively reduce WSB populations and subsequent damages, and might be justified by a variety of resource values. Such an approach would probably require annual treatments and would only be recommended following an analysis of specifically proposed sites.

For young or new infestations, direct suppression may be more effective. This situation exists on the Tesuque and Pecos Ranger Districts and the east side of the Forest in general. From a biological standpoint, large scale direct suppression strategies may only be viable for an additional year or two. Hence, appropriate environmental analyses should be initiated in the near future if direct suppression is to be considered a management alternative.

Finally, WSB is a long-term forest management problem which can only be permanently resolved by reducing stand susceptibility/vulnerability. We recommend you give a high priority to implementing the silvicultural alternative in management areas where affected resource values are of concern and silvicultural approaches are appropriate.

DOUGLAS L. PARKER

DOUGLAS L. PARKER
Director of Forest Pest Management

Enclosures (7)

D.Bennett:dtk:1/21/86
Rewritten:J.Linnane:dtk:2-3-86
Rewritten:D.Bennett:2-12-86

Table 1. Aerially Observed Defoliation in 1985

	ACRES OF DEFOLIATION			
Unit	Light	Moderate	Heavy	Total
Coyote RD	23500	20925	8590	53015
Cuba RD	16975	22025	4395	43395
Jemez RD	2710	4685	220	7615
Espanola RD[1]	8085	16130	11315	35530
Tesuque RD[1]	8280	4450	0	12730
Pecos RD	10015	3930	205	14150
Subtotal SNF	69565	72145	24725	166435
Bandelier NM	0	1130	0	1130
Jemez Pueblo IR	850	80	0	930
Santa Clara Pueblo IR	655	0	0	655
Total	71070	73355	24725	169150

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[1] Defoliation on east side of Espanola RD included with defoliation reported for Tesuque RD.

Table 2. Defoliation and Egg Mass Density Estimates for the 1977 Suppression and Evaluation Project Area.

Treated Subunits	1985 Percent Defoliation	1985 Egg Mass Density[1]
San Migel	59.0 ± 11.5	23.0 ± 8.5
Joaquin	46.5 ± 4.0	22.0 ± 5.0
Smokey Bear	52.5 ± 5.0	17.0 ± 3.5
Trail	51.5 ± 13.0	9.5 ± 4.0
Blue Bird	50.0 ± 6.0	28.0 ± 9.5
Red Top	38.5 ± 7.0	9.5 ± 1.5
Average	49.5 ± 3.0	18.0 ± 3.0

Untreated Subunits	1985 Defoliation	1985 Egg Mass Density
Ojitos	59.0 ± 4.5	15.5 ± 6.0
Lake Fork	47.0 ± 7.0	17.5 ± 5.0
Cochiti	46.0 ± 10.0	12.0 ± 2.0
Capulin	46.0 ± 6.5	17.5 ± 6.0
American Springs	51.5 ± 8.0	8.5 ± 5.0
Los Alamos	43.0 ± 6.0	15.5 ± 3.5
Average	49.0 ± 2.5	14.5 ± 1.5

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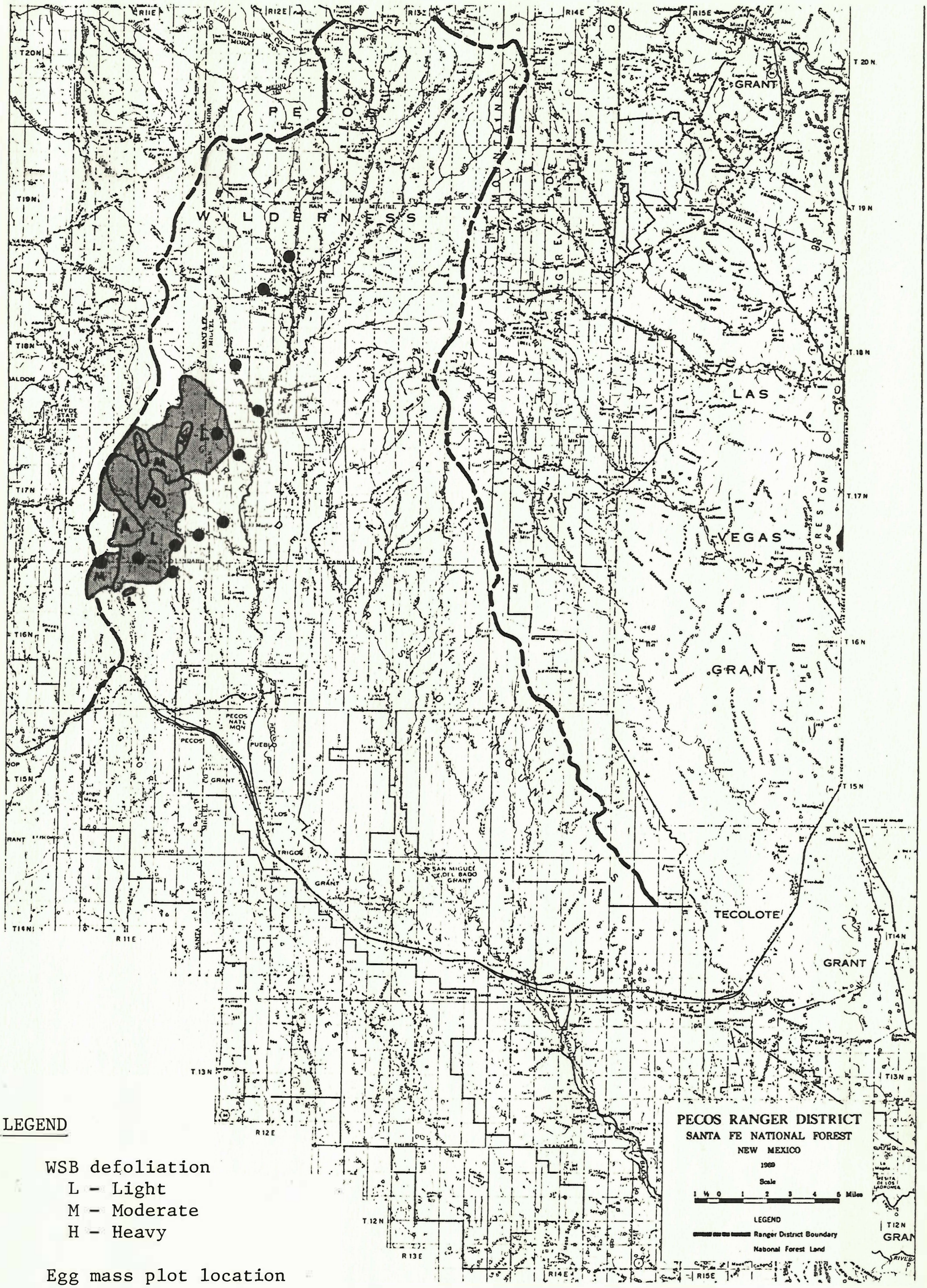
[1] Express as number of egg masses per meter square of foliage


R11E
R12E
R13E
R14E
R15E
T20N
T19N
T18N
T17N
T16N
T15N
T14N
T13N
T12N
PECOS
WILDERNESS
SANTA FE
MOUNTAINS
SANGRE DE CRISTO
LAS VEGAS GRANT
GRANT
HYDE STATE PARK
L
M
H
PECOS NATL MON
PECOS
PUEBLO
GRANT
LOS TRIGOS GRANT
SAN MIGUEL DEL BADO GRANT
TECOLOTE GRANT
THE CRESTON
PECOS RANGER DISTRICT
SANTA FE NATIONAL FOREST
NEW MEXICO
1969
Scale
1 ½ 0 1 2 3 4 5 Miles
LEGEND
Ranger District Boundary
National Forest Land

LEGEND

▨ WSB defoliation
L - Light
M - Moderate
H - Heavy

● Egg mass plot location

FIGURE 1.--Pecos RD sample area, 1985

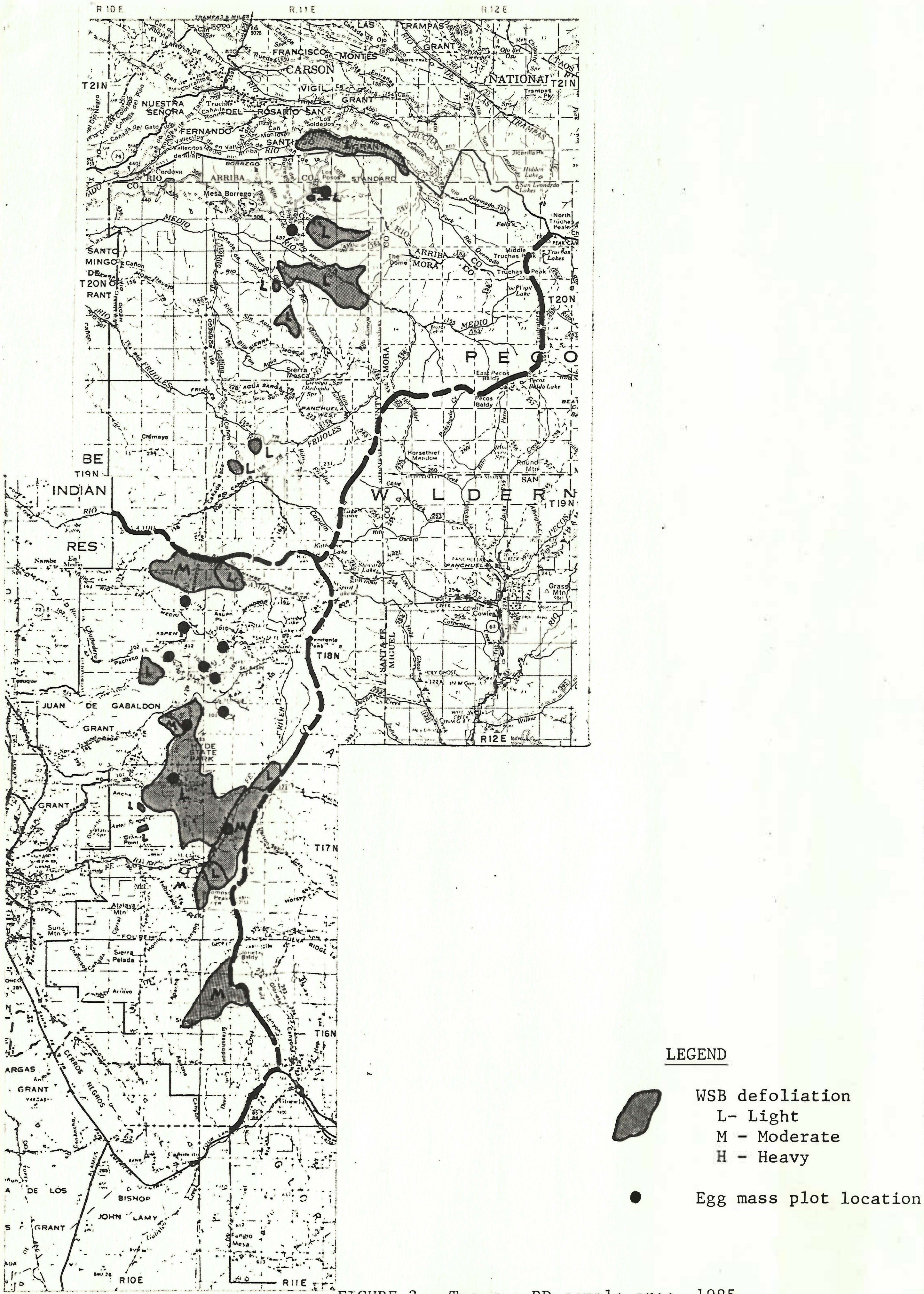

LEGEND
WSB defoliation
L- Light
M - Moderate
H - Heavy
Egg mass plot location
R10E
R11E
R12E
T21N
T20N
T19N
T18N
T17N
T16N
CARSON
NATIONAL
PECOS
WILDERN
INDIAN
RES
ARRIBA
MORA
SANTA FE
SAN MIGUEL
Pecos Baldy
East Pecos Baldy
Truchas Peak
North Truchas Peak
Jicarilla Pk
Sierra Mosca
Aspen Pk
HYDE STATE PARK
Tesuque
JUAN DE GABALDON GRANT
Atalaya Mtn
Sun Mtn
Sierra Pelada
Cowles
Grass Mtn
Horsethief Meadow
Round Mtn
Cordova
Mesa Borrego
Cerros Negros
Bishop John Lamy Grant
Fangio Mesa
L
M
H

FIGURE 2.--Tesuque RD sample area, 1985

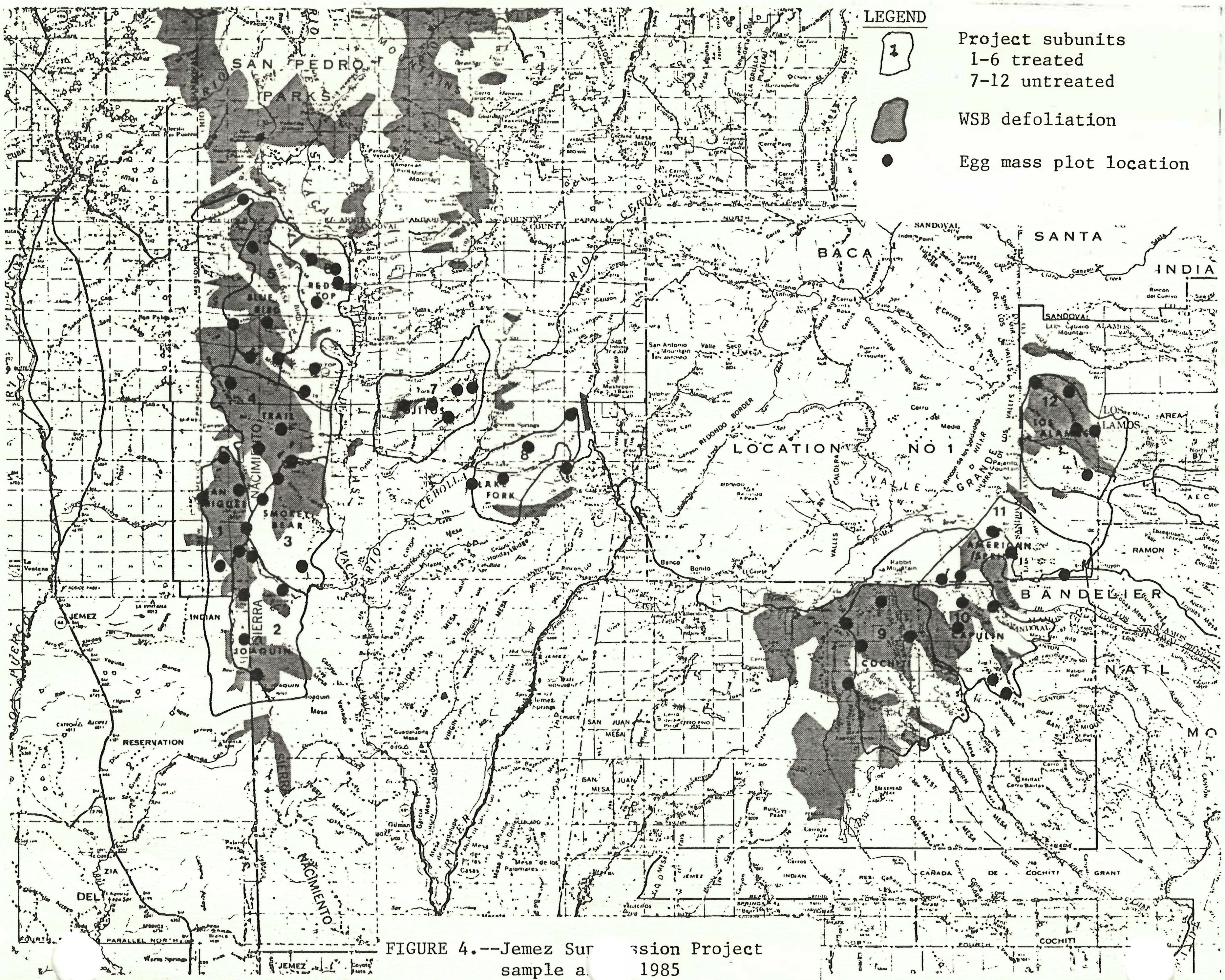
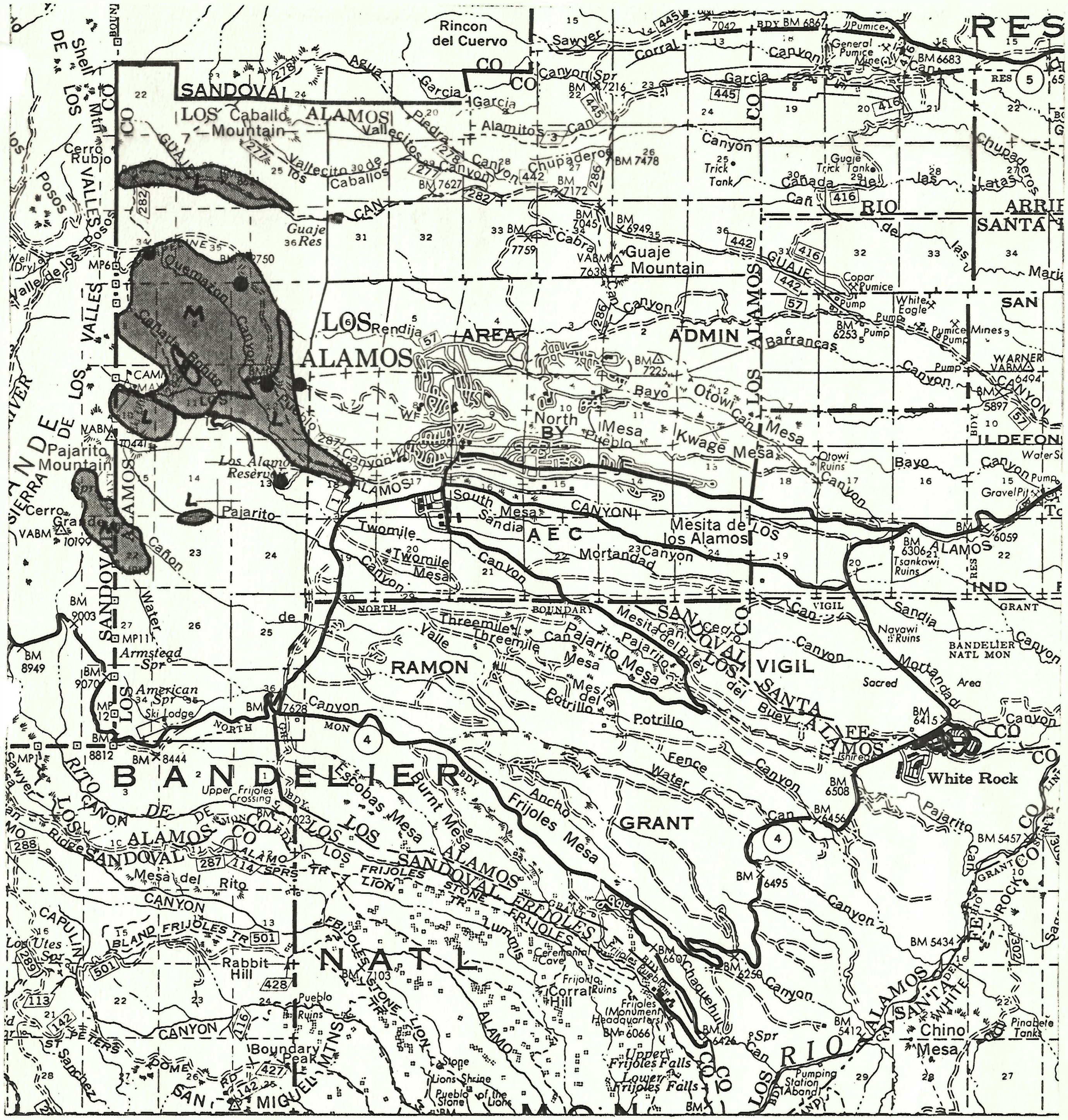

LEGEND
1
Project subunits
1-6 treated
7-12 untreated
WSB defoliation
Egg mass plot location
SAN PEDRO PARKS
SIERRA NACIMIENTO
SAN JOAQUIN
SMOKEY BEAR
TRAIL
RED TOP
BLUE BIRD
LAKE FORK
JEMEZ INDIAN RESERVATION
BACA LOCATION NO 1
VALLE GRANDE
SANTA
COCHITI
CAPULIN
AMERICAN SPRINGS
LOS ALAMOS
BANDELIER NATL
RIO CEBOLLA
ZIA
1
2
3
4
5
6
7
8
9
10
11
12

FIGURE 4.--Jemez Sup ssion Project
sample a 1985



Rincon del Cuervo
SANDOVAL CO
LOS ALAMOS CO
Caballo Mountain
Guaje Res
Guaje Mountain
LOS ALAMOS
AREA
ADMIN
North
BY
Mesa
Pueblo
Kwage Mesa
Otowi
Bayo
Pajarito Mountain
Cerro Grande
Los Alamos Reservoir
Pajarito
South Mesa
AEC
Mesita de los Alamos
Mortandad Canyon
Twomile Mesa
RAMON
VIGIL
GRANT
White Rock
BANDELIER NATL MON
Frijoles Mesa
Burnt Mesa
Escobas Mesa
Mesa del Rito
Rabbit Hill
Boundary Peak
Chino Mesa
Sawyer
Valle de los Posos
Cerro Rubio
L
M

LEGEND

▨ WSB defoliation
L - Light
M - Moderate
H - Heavy

● Egg mass plot location

FIGURE 3.--Pajarito sample area, 1985

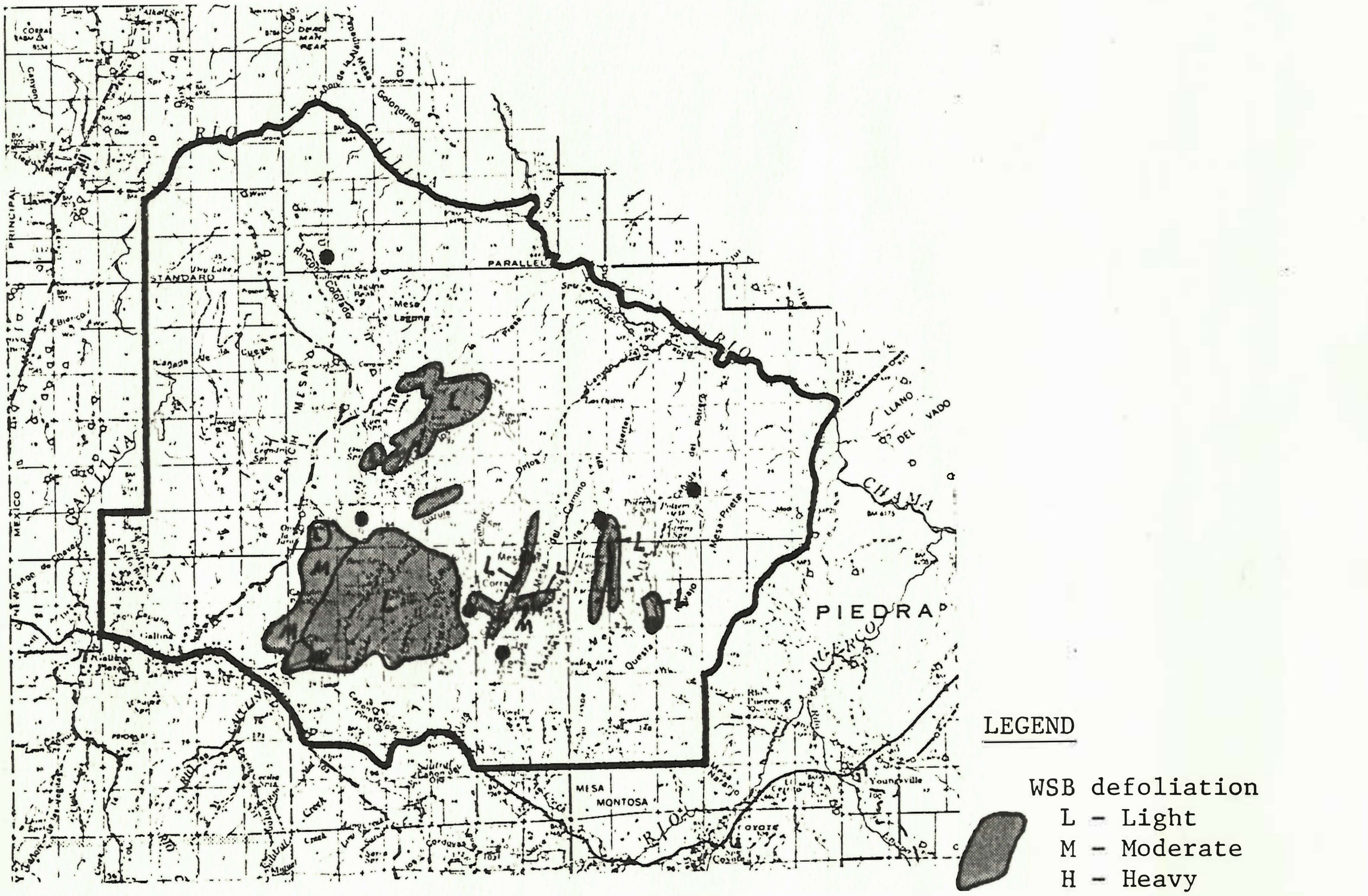

LEGEND
WSB defoliation
L - Light
M - Moderate
H - Heavy
● Egg mass plot location
L
M
H
RIO
PARALLEL
STANDARD
PRINCIPAL
MEXICO
LLANO DEL VADO
CHAMA
PIEDRA
MESA MONTOSA
Youngsville
Coyote

FIGURE 5.--Mesas sample area, 1985